On the Condition of the Carcass of the Unidentified Animal*

Sueshige SETA**

All changes in the condition of a body following death until the complete decay of the body are termed technically Leichenveränderungen. Changes in the early stages include such phenomena as the cooling of body, hypostasis, postmortem lividity, rigor mortis, etc., and those in the late stages are autolysis, putrefaction, etc. In addition to these changes, there are unusual phenomena such as mummification, adipocere formation and damage of the body by other animals. The photographs of the unidentified animal (Pl. 1) show that the body was already in the late stage of Leichenveränderungen at the time of its capture, leaving no conditions indicative of early phenomena.

Late Leichenveränderungen are in other words the decomposition of a dead body. All organs and tissues are soften and finally decayed completely by autolysis. When putrefactive bacteria are involved, putrefaction occurs and putrefactive gases are produced chemically in the intestinal tract and peritoneal cavity, and then in all subcutaneous tissues and parenchymae. Thus the body is inflated with a large amount of gas and comes to have a gigantic appearance. This condition is often found in the bodies of drowned persons.

It is virtually impossible to state in detail the condition of the carcass of the unidentified animal from the limited information available. The following are the conditions of the carcass based on the crew's observations and photographs: The carcass was partly covered by a whitish substance which was viscous or somewhat solid and had a putrid smell. This substance was readily torn off into pieces. There were reddish muscle-like tissues under the white layer. It seems proper to regard these conditions as indicating that adipocere formation had been going on in this carcass.

Adipocere is a state of a dead body where certain components of the body are formed into solid fatty acids or their compounds. Fat tissues therefore most easily produce adipocere, but muscles and internal organs can also undergo these chemical changes provided that they are soaked with fats. Adiopocere is produced mainly from subcutaneous fats. In the case of adipocere formation in muscles, the adipogenesis of the muscles is not involved in the mechanisms. Instead, muscles capable of producing adipocere are those soaked with glycerin and fatty acids derived from subcutaneous fats. Therefore, the formation of adipocere is seen more frequently in fatty bodies than in lean ones, and adipocere formation in muscles is preceded by that in subcutaneous fats.

The saponification of fats is one of the mechanisms of adipocere formation. Fatty acids produced by hydrolysis affecting fats become saponificated and insoluble when they are combined with alkaline earth metal ions and/or ammonium. In recent years it has been

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** National Research Institute of Police Science, Chiyoda-ku, Tokyo 102

accepted by many authors that the hardening of fats themselves is the cause of adipocere formation. Fats in a living body contains a rather large quantity of glycerin esters of fatty acids. Unsaturated fatty acids (liquid in the normal temperature) produced from fats by hydrolysis change into solid saturated fatty acids (stearic acids, palmitic acid and hydroxystearic acid) by direct hydrogenation. Neutral fats can therefore be transformed directly into adipocere.

Adipocere is produced from fats when dead bodies are left under wet and ill-ventilated conditions and putrefaction is prevented. Since water is a necessity for adipocere formation, these changes in a dead body occur more often in the water, more easily in sea water than in fresh water, or in wet ground than above ground. Adipocere thus produced is generally whitish or sometimes greyish yellow to brown dependent on humidity conditions. It is as hard as soap, and its viscosity ranges from a mortar-like low to a butter-like high. It emits a smell like cheese or mold. When dried it becomes solid like plaster, and makes a hollow sound when tapped. Adipocere is soluble in ether and alcohol, and floats in water. When heated it fuses and burns with a small flame. Adipocere is apt to be washed off from the body by the movement of water, and the muscles of the body become exposed.

According to the statements of the crew of the Zuiyo-maru and the photographs of the carcass, the body had a whitish substance sticking to its surface. A part of this substance was torn off into pieces and scattered on the deck. Referring to the general features of adipocere as explained above, the whitish substance agrees well with adipocere in its nature. The existence of reddish muscles beneath the whitish substance seems to indicate that adipocere had not yet been formed in the muscles.

In general, adipocere formation in sea water starts one to two months after death. About six months are said to be required for all the subcutaneous fat to change into adipocere. It has also been indicated that adipocere formation in muscles occurs three to four months after death and covers the whole body in one to three years. These data are from the adult human body, and hence do not necessarily apply to the animal under investigation. Moreover, the speed of adipocere formation is subject to variation according to temperature; high temperatures accelerate its formation. If the above observations on the human body are adopted for this animal, the adipocere formation on the whole surface of the head and back would indicate that the animal had been dead for at least six months. On the other hand, the fact that the muscles were still reddish suggests that the animal had been dead for a period not longer than 12 months.